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REPORT

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THIS IS UNEVALUATED INFORMATION

GENERAL MISSION OF THE GERMAN COLLECTIVE AT KRASNOARMEYSKIX

1. I was the leader of a small group of German engineers located in Krasnoarmeyskiy (known as Putilovo before the community of Krasnoarmeyskiy was incorporated). There were three groups in the German collective reporting to Design Bureau No.3. This bureau was headed by a Soviet, DAVISHEV, and reported to the Armament Section of the All-Union Ministry of Agricultural Machine Building (M.S.Kh.M.). See Report [redacted] for information on personalities and report [redacted] for area description.

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My group carried out design and development of air-to-air, ground-to-air, and air-to-ground missiles. This activity is described in paragraphs 9 to 29 of this report.

2. The TROMMSDORF Group carried out research on gas turbine propelled missiles and supersonic ram-jet power plants. I was isolated from the activity of the TROMMSDORF Group, and cannot give cogent information on their activity. For information on the TROMMSDORF Group activity, see Report [redacted] dated October 1953. 50X1

3. The BOEHM Group carried out design and development on ground-to-ground anti-tank missiles. I have some information on this group's activity, although it is only known to me through hearsay and social contacts. This information will be published in a future report.

4. I have given an evaluation of the contribution of the German Collective at Krasnoarmeyskiy and the potential of the Soviets to carry out successful missile development [see Report [redacted]]. This evaluation is based on my experience and observations during World War II, my activity in Berlin after the war, and my stay at Krasnoarmeyskiy. I have also prepared a chronological chart of my activity at Berlin and Krasnoarmeyskiy [see page 15]. 50X1

TECHNICAL ACTIVITY, BERLIN (GEMA AND BERLIN INSTITUTES)

Questioning on Former Rheinmetall-Borsig Development

5. At this time I was under the SKG (Soviet Kommandit Gesellschaft), Gema. Several former Rheinmetall-Borsig employees, headed by me, formed a small group whose mission was to gather, and to complete where necessary, literature associated with former Rheinmetall-Borsig developments. This activity was carried out approximately from July 1945 until January 1946. The projects on which information was gathered included the three models of Rheintochter; 10-second powderpropellant with one-second booster, 30-second powder propellant with two boosters located on the side of the missile, and one model with liquid boosters. Information was also collected on the Rheinboote, the R-100-BS, Fritz "X", various booster rocket developments, "Kurt", on experimental models of uncontrolled anti-aircraft missiles, Rheinmetall-Borsig bomb developments, and on the operation and construction of firing test stands and field measuring instruments for missiles. The ostensible purpose of this questioning was to determine the status of the Rheinmetall-Borsig development in rocket missiles.

The Design of "Kurt"

6. In approximately July 1945 my group was told to carry out an improved design, based on theoretical considerations, of the "Kurt" development. This was an air-to-ground uncontrolled missile similar to Fritz "X". The modification to the design would permit the use of this missile fired from a speedboat. This was not completed and appeared to me to have been a make-shift project to occupy our group until further work could be organized. This work was carried out in August 1945.

Design of the "Fluse" Missile

7. In the fall of 1945 our group designed a ground-to-air missile with the following characteristics:

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Maximum Weight	1000 kilograms
Altitude	20 Kilometers
Range	30-40 kilometers
Velocity	500 meters/second
Power	Ram-jet
Control	Radio Command
Target Information	Optical

In addition to our group, the EITZENBERGER and MUMMERT groups designed other portions of "Fluse" such as the guidance and control systems. My group concentrated on the power plant and airframe.

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This project was worked on until approximately January 1946. At this time, the design was fairly complete in all its details. I refused to work any further because of the lack of a wind tunnel to carry out necessary aerodynamic and combustion tests.

- a. Physical Characteristics of the "Fluse." The "Fluse" missile was supposed to be an annular-wing ram-jet supersonic missile. The wing was actually hexagonal in shape. It was found ~~it~~ was high enough to furnish the lift necessary for control. The control surfaces were located forward of the wing to give a quasi-canard construction to the "Fluse." The body of the missile housed the control servo equipment, fuel, booster rocket, etc.
- b. Power Plant. The design of the power plant envisioned a multiple-shock wave supersonic diffuser. Vaporized fuel is furnished through a perforated tubular grid. It was intended to supply also a burning mixture of nitro-cellulose-nitroglycerine powder and fine aluminum powder to ensure combustion at supersonic flows.
- c. Control System. A cruciform control surface was provided for in the "Fluse" missile. Provisions were also made in the body of the missile to house a command radio system, and a twin-servo system with batteries for power. Similar to the Rheintochter, this missile was not controlled in the roll axis. It was planned to use a gyroscopic resolver to feed control signals to the appropriate axes.

MUMMERT's and EITZENBERGER's groups handled this problem. For information on the design of the control system, see Report

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- d. General. Later modifications to the design included: (1) Reduction of weight to 650 lbs; (2) Buoy-launching device; (3) Use as an underwater missile; (4) Increase of range to 50-60 kilometers for attack against other ships. Only a short time was spent on these design changes. They were not actually ordered; rather they were suggested by the Soviet Shipbuilding Ministry.

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There was great Soviet interest in this missile design, and many officials visited my group during this time. The design activity was terminated in approximately January 1946, when I refused to continue without experimental tests both for combustion and determination aerodynamic coefficients. [Reference is made to pages 3 to 9 of Report [] This report contains further 50X1 technical details on the design of the "Fluse" airframe and power plant. Drawings of "Fluse" reproduced previously are included here on pages 16-19 for reference.]

Preparation of Technical Data on Former Rheinmetall-Borsig Projects

6. During the period from April until October 1946, my group was occupied with gathering technical data on the Schmetterling, [] Rheintochter and HS-294 missiles. The ostensible purpose of this was to furnish enough data to enable the Soviets to fabricate these missiles. The Rheinmetall-Borsig files were captured by the Soviets almost intact. My group was also directed to write technical reports on recommended modification to these missiles. [Reference is made to Report [] which contains detailed 50X1 information on the projects carried out during this period by source's group and the other groups at the Berlin Institute.]

TECHNICAL ACTIVITY AT KRASNOARMEYSKII

The ABRS-220

9. The ABRS-220 is an air-to-air powder rocket missile. The design of the ABRS-220 is a modification to the RB-100-S rocket missile developed in Germany during World War II. The principal differences between the German World War II development [] 50X1 and the ABRS-220 are the following:

- a. Impulse increased from 4,200 kg./sec. to 4,700 kg./sec.
- b. Fuel increased from 21 kg. to 24 kg.
- c. Operating distance increased from 800-900 meters to 1,200-1,600 meters
- d. Velocity change increased to 440 meters/sec.

[In addition to the valuable information obtained in learning about the science of designing and developing an air-to-air missile, the Soviets apparently used this project to "wring out" [] group. The later development of the "Ring Magazine" missile (see paras. 23-25) followed naturally from this design.]

- a. Airframe. The airframe is a bomb-like aerodynamic shape, with a cruciform tail stabilizer. I have included a rough drawing of the ABRS-220 [see page 207]. An impact fuse is located in the hollow ogive. Behind the ogive, a large number of small incendiary cylinders were packed. In the center section is located the explosive charge, the electrical timer, and the fuse for the rocket power plant.

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- b. Power Plant. The fuel consists of sticks of compressed Diglycol powder, weighing 24 kilograms. The total impulse produced was 7,400 kg./sec., and the thrust was found to be 190-195 kilograms. Terminal speed was 440 meters/sec. plus the speed of the aircraft.
- c. Accuracy. The ABRS-220 is a spin-stabilized, uncontrolled air-to-air missile. The design requirement put to our group was one out of two hits on bomber targets. A considerable portion of the time spent by the group on this project was in carrying out calculations of dispersion. Three different methods of obtaining a rotary motion were considered as follows: (1) Canted rocket thrust (2) Assymmetric spoilers on the fin stabilizer (3) Canted cruciform fin stabilizer.

I rejected the third method, because the Soviets would not have been able to manufacture the parts with the required accuracy.

- d. Tests. Models of the ABRS-220 were tested on the ground firing range at Krasnoarmeyskiy. Not enough tests were conducted to determine the accuracy of the missile. I did not witness any air firing tests.
- 10. After completion of the German activity on ABRS-220, it was discovered that the Soviets were engaged in theoretical and practical aspects of a similar project. The results of the Soviet tests made in competition with the German built models were not made known to me. The Soviets evidently placed a high priority on this project as evidenced from the following. At the end of the work on this project, I was asked to give a lecture on the ABRS-220 design. The lecture took place at the Soviet institute near the Yaroslavskiy railroad station and was attended by a great number of guests including high ranking officers and civilian specialists. This project was terminated by turning over to the Soviets complete plans, descriptive literature, and technical instructions.

The Sokol Missile

- 11. In the spring of 1947 my group was pressed to take up work on a controlled air-to-air missile based on the "Falke" development. In Berlin, where a certain amount of preliminary work had taken place, the term "Super-Moeve" was applied to a supersonic version of "Falke." In the USSR this project was dubbed "Sokol."
- 12. I successfully put off working on "Sokol" at this time by pleading inadequacy of personnel and facilities to carry out a controlled missile development. The Soviets accepted my reasoning that "Sokol" was not feasible as long as they did not have wind tunnel results and a control mechanisms laboratory. I was told that I would receive the wind tunnel data in due time and in the interim was assigned another project, the ABRS-240 [see paras. 16 -19 below].
- 13. However, a considerable amount of pressure was put on my group to continue our work on the "Sokol" design. In spite of the handicaps, I was forced to accede to the Soviet desires and started to work on it on or about 1 January 1948, without benefit of an appropriate

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laboratory, adequate personnel, and wind tunnel facilities. This project represents the only missile worked on in the USSR, which involved a control system. Borrowing heavily from *Rheinmetall*, and with obviously unqualified personnel, we laboriously carried out rough designs for the "Sokol."

a. Design Characteristics. The "Sokol" is a controlled air-to-air missile powered by a solid propellant. The design included the following characteristics:

- (1) Maximum Altitude 12 km.
- (2) Maximum Transverse 10 g. to 6-8 km. altitude Acceleration
- (3) Maximum Velocity 800 meters/sec. at 6-8 km. altitude (missile plus aircraft)
- (4) Combustion period up to 10 sec.
- (5) Maximum Velocity 1250 km./hr. of target
- (6) Attack method pursuit curve
- (7) Warhead incendiary explosive
- (8) Fuse electrical or acoustical proximity fuse
- (9) Control link VHF pulse command system
- (10) Range 1200-1800 meters/sec.

b. Physical Characteristics. The "Sokol" is a canard missile with swept-back wings, and vertical stabilizers located on the tips of the wings. Vertical control is achieved by operating the elevators in unison. Roll is controlled by differential operation of the elevators. *[See pages 21 to 24 for various sketches of the "Sokol." These drawings were obtained from material reproduced in Report [redacted] Technical design details can be obtained from Enclosure (A) of this reference.]*

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c. Control System. The "Sokol", after being fired from the mother plane, was to be controlled through a "Beeper" by the pilot. Turns could not be accomplished, except by coordination in roll, as in normal aircraft. Consequently, the control process was exceptionally difficult considering that an optical sight was used. Provisions were made for inclusion of a proximity fuse to detonate the warhead near the target. I cannot give any further technical information than that I have previously submitted *[See Enclosure (A), Report [redacted]]*

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14. At the start of this project, the Soviets placated us with the promise of a new servo-laboratory and wind tunnel facilities. After a brief study and rough layout work, the weight and dimensions were given to the Soviets. After a meeting at the Secret Section of the Ministry of Agricultural Machine Building, at which the chief engineer of the Ministry was present, it was decided to have our group prosecute the "Sokol" design intensively. In the place of experimental wind-tunnel data, I was told to use my mathematicians for verification of the design. I pointed out that at times several weeks of calculation were necessary to resolve a problem that could have been done with a single wind tunnel test. However, our theoretical work was excellent, and I feel confident

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that wind tunnel tests would only lead to minor modifications. The lack of verification did not appear to disturb the Soviets. Their interest seemed to lie in the system design. As a part of "Sokol", a new servo control system was designed. It was to be driven by a propeller-driven generator. Where our group was incapable of carrying out detail design, approximate dimensions and weight were given to the Soviets, along with broad functional characteristics.

15. The design was completed about August 1948 and turned over to the Soviets along with the supporting theoretical calculations, ballistic and hit probability calculations. This included a study of the effect of human error in the control system. The data was turned over and discussed at a technical meeting at KB No.3, and the project was dropped abruptly by our group. All the data and documents were sealed and sent by courier to another location. No requests ever came to our group on "Sokol" after this meeting.

The ABRS-240, "Molnya"

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16. As a substitute to the "Sokol" project, the Soviets asked us whether we could build an air-to-ground rocket with the following characteristics:

- a. 1000 - 1200 meters range
- b. 50 per cent of missiles in a target area one meter square.

I complained that this accuracy was impossible with an uncontrolled rocket, but our reply to the fulfilling of these requirements was the ABRS-240 "Molnya."

17. In April 1947, our group began the design of ABRS-240. The design itself was based in part on certain intuitive assumptions by me and the group, i.e., optimum power for the missile, size of stabilizer, rpm of main missile, etc. As the detailed design progressed and calculations were made, the rough design proved to be optimal in all phases. The Soviets were skeptical about the reliability of expelling the projectiles without detonating them, the stability of the projectiles, and the type of explosive pattern that would be formed; as a result, permission was given to make three test missiles. These were assembled from parts made in the Soviet experimental workshops at Krasnoarmeyskij.

a. Design Characteristics.

The ABRS-240 is an air-to-ground anti-tank missile containing seven projectiles in the warhead. This missile was to be fired from relatively slow aircraft (420 km./hour). The terminal speed of the missile was designed to be 114 meters/sec. plus the aircraft speed. The warhead contained a cluster of seven powerless projectiles which were ejected a few hundred meters in front of the target by explosive charge detonated by the change in pressure in the rocket motor after burning out. Upon expulsion from the body of the missile, the projectiles were accelerated tangentially because of the rotation of the main missile. The center projectile remained on the same course as the main missile. The result was that the projectiles caused a ring-like pattern in the vicinity of the target. The projectiles

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were detonated by air impact-fuse armed by a fan-driven electrical system. Page 25 contains a drawing of the ABRS-240, showing the design details and a tabulation of the design data of the missile. Page 26 contains a drawing of the hollow-charge projectile used in the warhead of the ABRS-240. Page 27 contains a drawing of an improved projectile designed by the [redacted] group. Further technical details can be obtained from Report [redacted]

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b. Tests. These missiles were fired on the ground firing range at Krasnorameyskiy. I attended these tests; the missile behaved as designed. After several hundred yards of flight, the ejection of the projectile took place and then separated from the missile airframe. The folding fins opened and the projectiles stayed on course. Even the empty airframe, without ogive, stayed on course. After the tests, the project was assigned a high priority and efforts were concentrated on completing it in the shortest possible time.

18. After the tests, our group received official requirements for an improved ABRS-240 to decrease the caliber, decrease the size and warhead of the projectiles, and increase the penetration capacity of the projectiles. These requirements were as follows:

Total Weight	less than 60 kg.
Caliber of missile	210 mm.
Caliber of projectiles	92 mm.
Penetration power	220 mm. armor plate
Firing	by pilot operated button
Fuse of projectile	2.66 (Redesign of pulse generator fuse)
Stabilizer	Folding fins only
Power Plant	No change

In addition, production drawings were required, incorporating manufacturing simplifications. The only remaining activity on this project was on hit-probability studies carried out over another six months' period while our design group worked on the next project.

19. After the test firing of the ABRS-240, a Soviet design group in KB No. 3 was given the new requirements and began work on the design of an improved ABRS-240. I saw, during visits to the experimental workshops, parts being manufactured that could be definitely identified with ABRS-240. I noted that several changes had been made by the Soviets in the manufacture of the missiles. For example, a leather gasket was changed to cardboard allowing some of the combustion gases to escape. In order to prevent any further knowledge of this activity, an order was issued in the winter of 1948-1949 placing the workshop off limits to German personnel.

The Zenith Missile

20. The Zenith design resulted from the Soviet requirement for a cheap, uncontrolled mass antiaircraft weapon. The following detailed requirements were given to our group in the fall of 1948, after the "Sokol" project was terminated:

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Altitude	18-20 km.
Control	Predictor (Optical or radar) No control after firing
Batteries	To be fired in groups from simple launching platforms
Warhead	500 grams of hexogen

21. We developed a design of a two-stage, ground-to-air solid propellant rocket to meet the above requirements. The design included all the important details. However, the theoretical ballistics carried out in support of this design were rather sketchy. The design, once it was decided to use a two-stage missile, was based on old values we remembered were used during wartime at Rheinmetall-Borsig. This design, with supporting literature, was turned over to the Soviets at KB No.3. [It is interesting to note that the data on the Zenith was not translated until nine months later, and at that time, sent to the Agricultural Ministry. At this time, several questions were asked about the Zenith, on length of time for development, and several minor items. The total spent on this project was three months.]

22. I have included drawings showing the general layout of the Zenith [see page 28 of this report] and below I have given, point by point, a description of the missile. [See pages 3 and 4 of Report [] containing a table of design characteristics which source was unable to elaborate upon during the reinterrogation.]

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Point 1 Impact Fuse

This impact fuse is spin-armed. The rotation is obtained by the slanting of stabilizer surfaces. The fuse itself contains in addition to the impact mechanism which operates on the ordinary centrifugal principle, a self-distribution device which, during the descent of the projectile, would ensure an explosion of the second stage if the target were missed.

Point 2 Detonator

Attached to the fuse. It is possible that the dimensions used here are not the final version since the fuse was to be supplied by the Soviets. It is probable that the diameter of this primer is a little larger. The Soviets generally use rather flat-detonators.

Point 3 Warhead Casing

Consists of deep drawn steel having wall dimension between 1 mm. and 1.5 mm. In front a threaded nut is provided for attachment of the fuse. In the rear of the cylindrical part is located a drawn steel plate of 4 mm. thickness. This plate is connected with the forward ogive by means of a circular welded seam.

Point 4 Panel

A deep drawn steel cup having a thread that serves as a terminal of the missile's combustion chamber.

Point 5 Explosive

It was to be a 1-to-1 mixture of Hexogene and Trinitrodonol, with a slight amount of aluminum "Pyroschliff." This addition was thought to achieve maximum penetration effect based on our experiences in Germany.

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Point 6Combustion Chamber

The chamber has a thermal protective lining in order to prevent the burning-out of the rocket chambers due to the hot missile gases. Without this protective coating, we would not have been able to use 1.5 mm. steel for the combustion period.

Point 7Powder Propellant

Outside diameter: approximately 61 mm.
 Inside diameter: approximately 8.5 mm. (for the channel).
 The two interfaces are thermally insulated to prevent combustion in the direction of the axis. Along the circumference, three centering pegs are located.

Point 8Three Centering Pegs

The three pegs which are located around the circumference are connected with the powder charge support. The charge centering support is a cup of drawn steel which has many holes on its interface.

Point 9Propellant Supporting Panel

This is the propellant charge support which must transmit the acceleration forces to the powder charge. The structure of the support or panel can be seen in Detail A and Detail B.

Point 10Powder Charge for Igniting the Main Missile

This charge was stored in a closed celluloid capsule. At the center of this capsule, a very thin-walled air-tight celluloid disk (or panel) was located which had to be destroyed by the burning gas. The capsule itself was made of thicker celluloid and thus was not destroyed by the gas.

Point 11Nozzle

Made of a thick-walled steel pipe. The required enlargement of the cross section was made by stamping. The joint with the rocket combustion chamber was to be accomplished by a high-temperature pressing process. The smallest diameter is approximately 17 mm.

Point 12Steel Tube

A cylindrical pipe having a wall dimension of approximately 1 mm. It was welded by means of a circular welding seam to the nozzle panel. On the pipe were affixed the four stabilizing surfaces.

Point 13Stabilizing Surfaces

The four stabilizing surfaces were canted at an angle of approximately 3 or 4 degrees to assure the required spin during flight. In the rear of the steel tube, some centering was provided by means of the front panel of the adjoining basic stage. This centered onto a peg in the nozzles. Transverse forces were transmitted at this point.

Point 14Centering Peg

This conical-shaped peg fits into the nozzle of the second stage. This is required in order to assure a rigid connection between the two halves of the missile. A catch mechanism located at this point made possible the safe

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transport of the two stages on the ground and quick assembly at the launching site. The catch mechanism was replaced by a more simple version using a copper shear pin. It was believed that a quick release catch mechanism would allow the second stage to be fired alone against low flying targets. Inside of the peg was a delay powder composition which was coupled with the pressure-igniter. This pressure-igniter was activated by the propellant gases of the first stage. Inside is a cylindrical drill-hole in which a copper-sealed piston is located. The piston is thrown forward by the gases of the first stage. In its forward position the piston hits the firing pin which ignites a percussion cap. This results in the combustion of the delay powder composition.

Point 15The Forward Sealing Panel of the First Stage

A stamped steel part which had a threaded connection on the frontal interface as well as in the curved position. This curvature permitted an additional centering of the casing of the second stage. The sealing panel had an outside thread which was screwed on to a steel ring. The steel ring in turn was connected with the 2.7 mm. pipe by means of a welded seam. The caliber of the steel pipe was approximately 120 mm. On two diametrically opposed places on the forward sealing panel, pegs protruded in which the guide pin was screwed. Through this guide pin, the igniting voltage was to be fed to the missile igniter. For this purpose an electrical percussion cap was placed in the shaft of the guide peg. The explosion of charge ignited the centrally located powder charge.

Point 16Black Powder Charge

The black powder charge was contained in a thick-walled celluloid capsule which had weak points around its circumference. These permitted the penetration of the igniting explosion. The celluloid capsule was centered by means of a centering ring.

Point 17Centering Ring

This was pressed of deep drawn steel. It had flanges which were bent inwards and served to hold the celluloid capsule. Three centering pegs were attached to the centering ring.

Point 18Centering Pegs

These pegs centered the main powder propellant charges of the first stage.

Point 19Frontal Area Insulating Layer

Located on the propellant stick.

Point 20Powder Propellant Stick

Outside diameter of 107 mm.

Inside diameter of 15 mm. (channel diameter)

Total length - 840 mm.

The stick was heat insulated at the point of contact with the three centering pegs. This prevented the combustion front from starting at these points of contact.

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Point 21 Powder Supporting Panel

Acceleration forces are transmitted by this panel to the propellant charge of the first stage. It consisted of a steel ring approximately 3 mm. thick which was provided around its circumference with three flat iron strips to center the missile's combustion chamber.

Point 22 Sealing Panel

This panel, was also joined to the nozzle. It was a pressed part constructed from a thick-walled pipe. The thick-walled pipe was turned out in the direction of the gas jet in order to obtain an enlargement of the cross-section. The necessary enlargement for the missile's combustion chamber was to be achieved by a high-temperature process. The connection between the panel and the pipe was to be effected by means of a circular welded seam.

Point 23 Conical Steel Casing

This was designed as a fairing to enclose the nozzle. The fairing also served as a means for attaching the four control surfaces.

Point 24 Control SurfacesThe Ring Magazine Missile

23. During World War II, the Germans had planned to improve the RB-100-S air-to-air missile by using small ballistic explosive projectiles in the warhead instead of the incendiary cylinders. This improvement was called "Miki." After the "Zenith" project, the Soviets wanted our group to continue along these lines. The Soviets did not approve of the cluster warhead, nor of the length of the missiles designed. They consequently gave new requirements, in general to shorten the over-all length, and utilize a ring magazine construction; these requirements were as follows:

Range	800-1000 meters
Speed differential	350 meters/sec.
Warhead	Cluster of explosive ballistic projectiles
Projectile Fuses	Impact and Time delay for self-destruction
Main Fuse	Time delay

In a short time, many different designs were presented. Only the representative ones are reported on.

24. The Ring Magazine missile follows generally the design of the RB-100-S. Ten different designs were carried out over a period of two months. They differed from the basic design in methods of expelling the projectiles and numbers of projectiles. The airframe of this missile was approximately 1.5 m. long and approximately 300 mm. in diameter. The propellant, like all the designs carried out at Krasnoarmeyskiy, was solid powder sticks. Stabilization was to be maintained by a cruciform tail. The projectiles were to be ejected after a time delay and form a cone

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of fire designed to hit the target at maximum range 50 per cent of the time. The warhead of the projectiles was to be approximately 4 kg. of incendiary material detonated by impact, or by a self-destruction time delay fuse. The projectiles themselves were without power, and stabilized by folded fins which opened out to 90° as the projectiles were ejected. I have included drawings showing the two principle designs of the projectiles for the Ring Magazine missile, along with pertinent data. [See pages 29 - 31. Also, on pages 32-34 are reproductions of the drawing contained in Report [REDACTED]. Further details of the design of this missile are contained in this reference.]

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25. The design of the Ring Magazine missile and its variation was carried out from January 1949 to May 1949. In the final reports on these designs, drawings were included which did not show all the design details. However, the propulsion unit itself was fairly complete in order that fabrication could be started immediately by the Soviets. The ballistic calculations were carried out only for the critical values and not in as great detail as on the earlier projects. The work was principally engineering design, and only 30 per cent of the group's time was spent on ballistic calculations. Nothing further was said to us after our reports were made on this missile. During the winter of 1951-1952, I accidentally observed test firings of a missile which was undoubtedly built along the lines of the "Ring Magazine" missile. Since the altitude of the aircraft was approximately 10,000 ft., I could only count the bursts and determined from this that several of the variations in the design were built. Some showed 24 bursts; others, 50 bursts; and on [REDACTED] as many as 70-80 bursts.

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[REDACTED] see page 11 of Report [REDACTED]

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26. We were directed to design a launching device to be housed in an aircraft of unspecified dimensions and configuration. This device was to launch 48 air-to-air missiles in succession. During this time, there was a closer working arrangement between the Soviet military and the German group. A colonel (Air Force) came often for briefings and occasionally offered suggestions as the design progressed, but I do not remember his name. He was a permanent representative of the Soviet Air Force at Krasnoarmeyevskiy.

The Automatic Rocket

27. The Automatic Rocket, is a weapon similar to the "Mighty Mouse" air-to-air missile. An automatic launching device fires 48 air-to-air missiles from the mother aircraft. The missiles of this weapon are not controlled. The design of the Automatic Rocket comprised two pods which carried 24 missiles each. The missiles were mounted on an endless belt which was rotated by motor. As each missile reached the lowest point in its travel, it was automatically released by an electrical contact made at that point. Every other missile was set back a few inches, to prevent malfunction from contact between adjacent missiles. The order of firing was such that the front row was fired first, and then the second. The endless belt thus made two full

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revolutions. See page 35 for drawing of the Automatic Rocket.

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28. This project was initiated in May 1949 and was completed in August 1949. It represented a fairly quick design solution of the mechanical problem posed by the Automatic Rocket requirement. Design drawings for a prototype launcher were turned over to the Soviets along with a briefing by me, and no more was heard on this project. Not enough time was given to complete this project, and the plans were general. Ballistics of the missile itself were barely touched by our group.

Firing Tests of ABRs-240 Projectiles

29. In the last few weeks of 1949, our group was directed to carry out penetration tests of ABRs-240 projectiles. I cannot give much information on this subject, in view of its short period of duration and my lack of direct contact with it. I do know, however, that the warheads involved showed a penetration of 600-800 millimeters. See Report [redacted] for detailed information on the firing range at KB No. 3.

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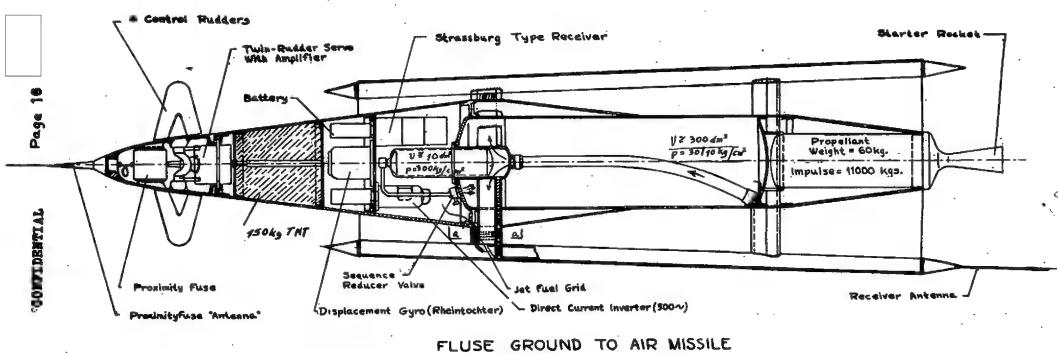
C O N F I D E N T I A L

CHRONOLOGICAL ACTIVITY OF OUR GROUP
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BERLIN (GEMA AND BERLIN INSTITUTE)								
ACTIVITY	1945	1946	1947	1948	1949	1950	1951	1952
Questioning on former Rheinmetall-Borsig Missile Development		XX						
Counter-Invasion Missile "Kurt" Air to Ground Missile		XX						
"Moeve"-Design Air to Ground Missile		XX						
"Fluse" (Ramjet) Ground to Air Missile			XX					
Prepared data on "Rheintochter" "Schmetterling" HS-293, HS-294, Fritz "X"			XX					
PUTILOVOD - KB-3								
Modification of "RB 100S" to ABRS 220 Air to Air Missile				XX				
Preliminary Design of "Super Moeve" or "Sokol"					XX			
"ABRS-240" (Molnya) Anti-tank Missile					XX			
"Sokol" Air to Air Missile						XX		
"Zenith" 2-Stage Ground to Air Missile								
Design of "Ring Magazine" Air to Air Missile						XX		
Automatic Air to Air Rocket							XX	

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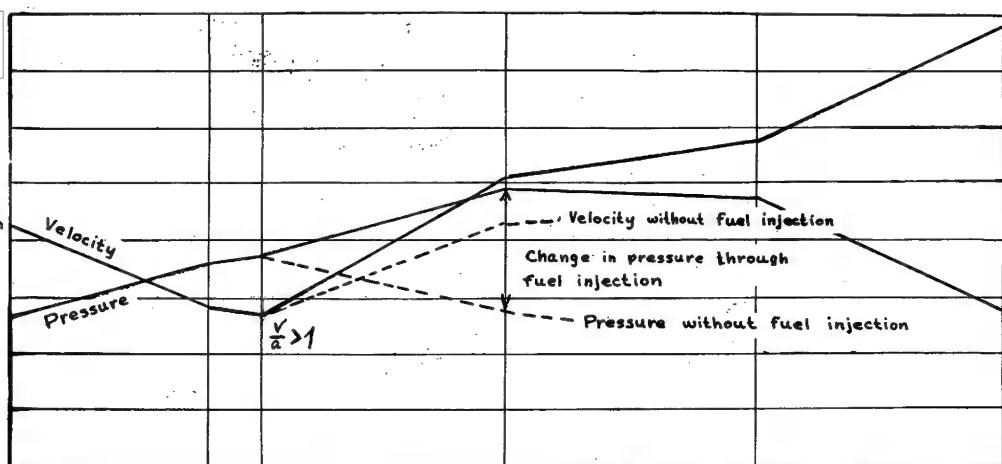
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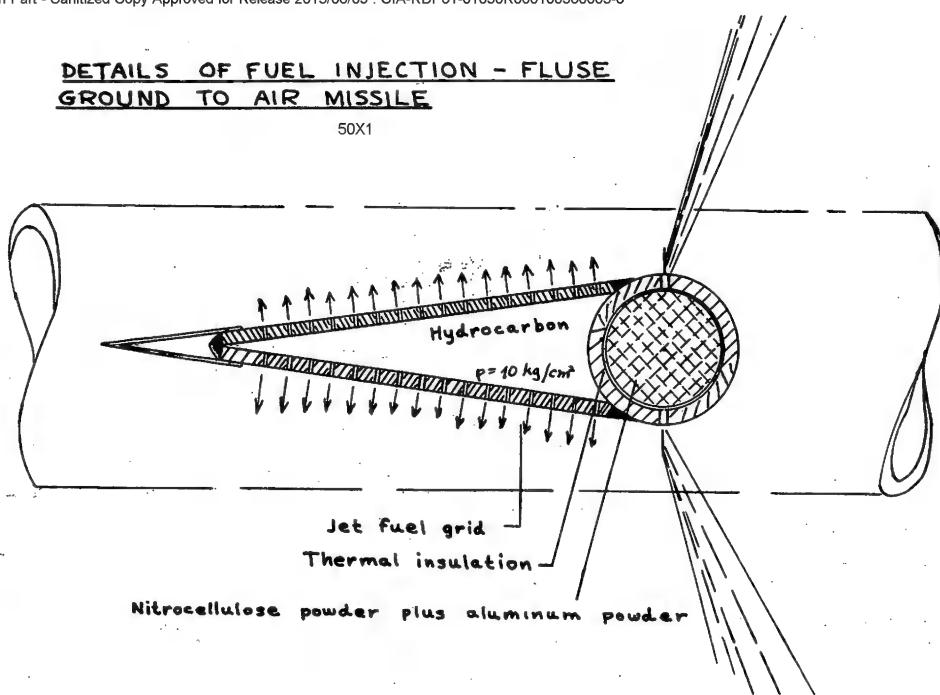
PRESSURE-VELOCITY DIAGRAM OF THE FLUSE
GROUND TO AIR MISSILE

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DETAILS OF FUEL INJECTION - FLUSE
GROUND TO AIR MISSILE

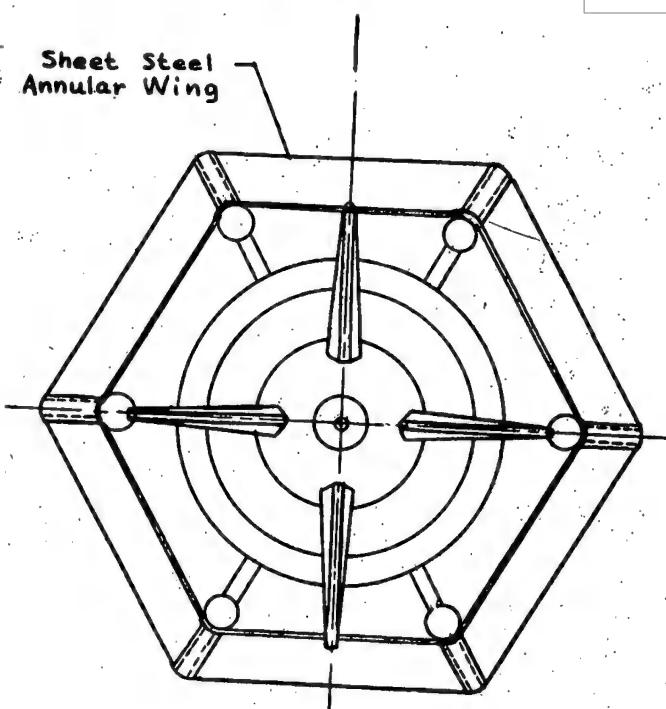
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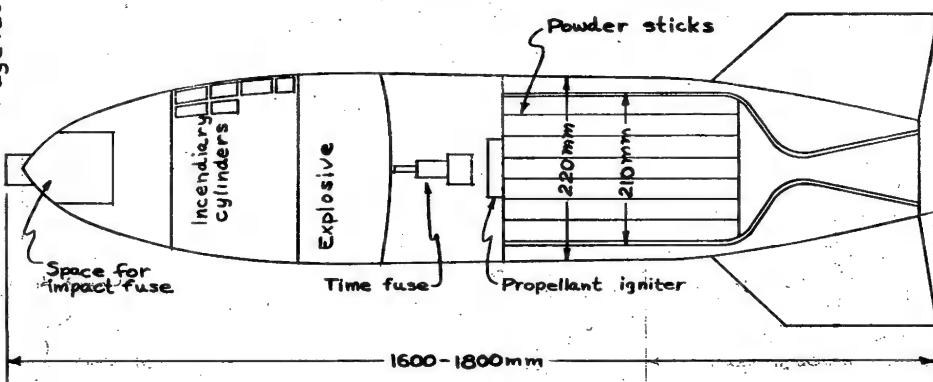
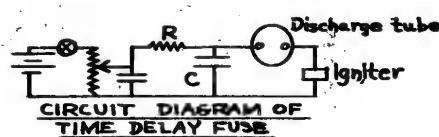
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FRONT VIEW OF THE FLUSE
GROUND TO AIR MISSILE

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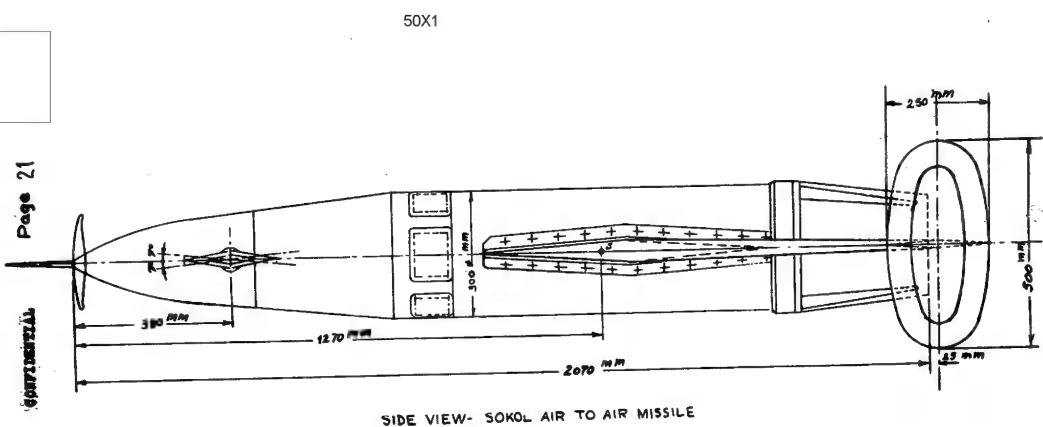
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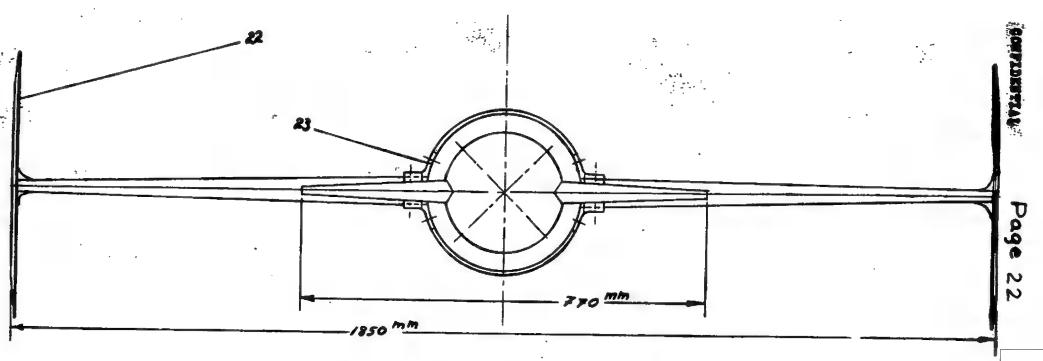


THE ABRS-220 AIR TO AIR MISSILE

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FRONT VIEW- SOKOL AIR TO AIR MISSILE

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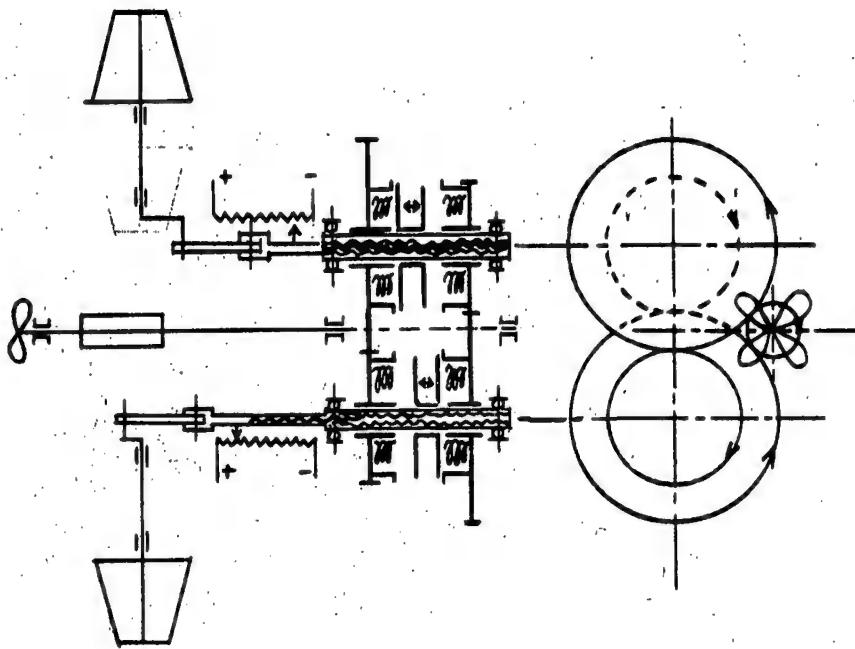
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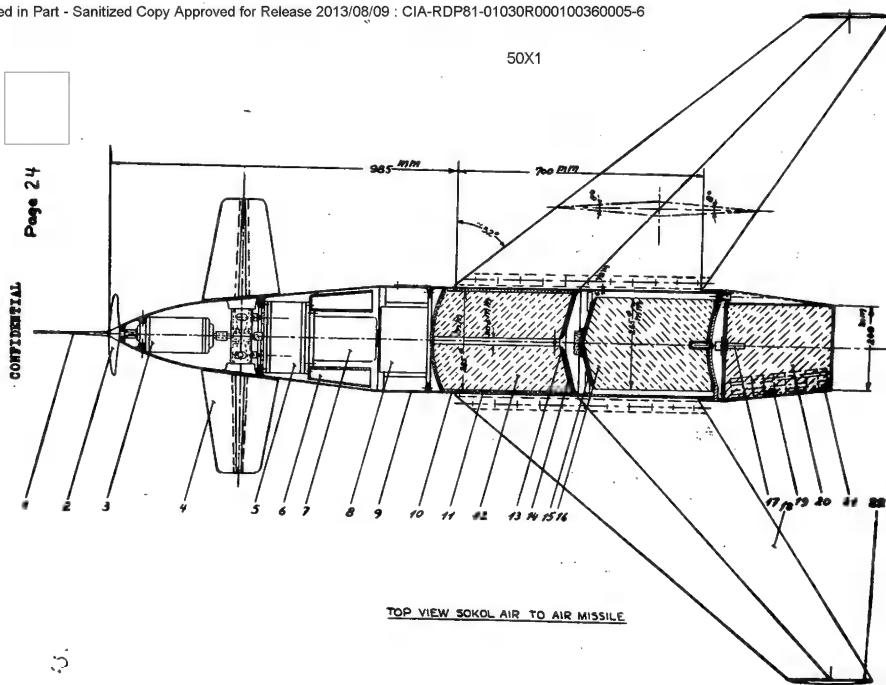
Page 23

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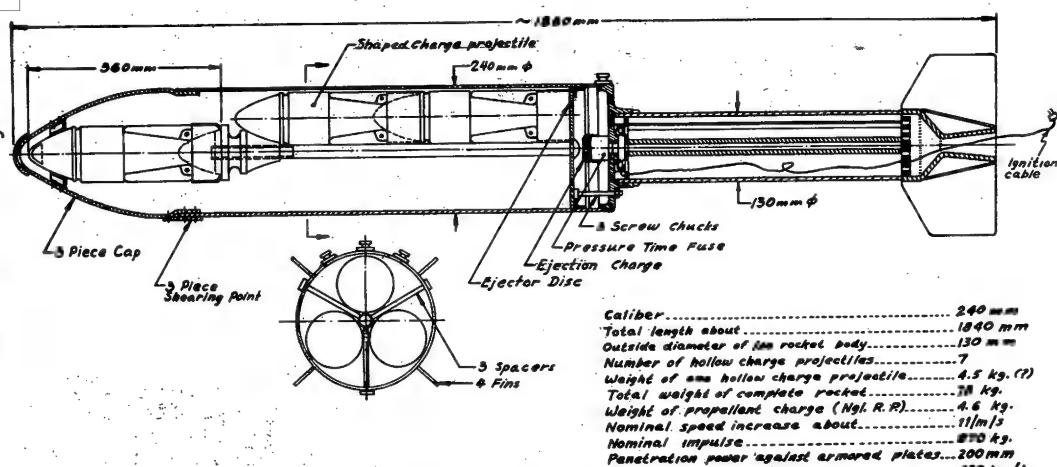
KINEMATIC DIAGRAM TWIN Rudder SERVO SOKOL AIR-TO-AIR MISSILE

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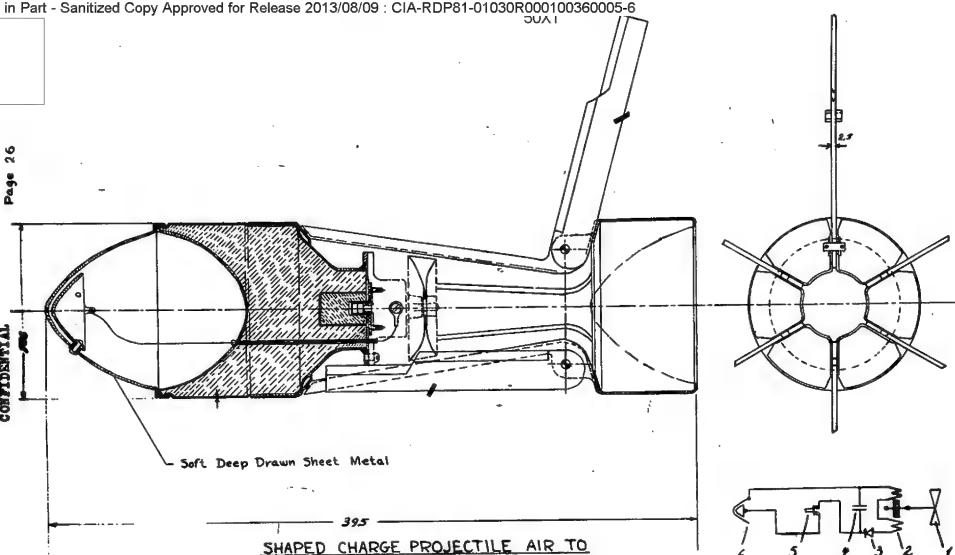


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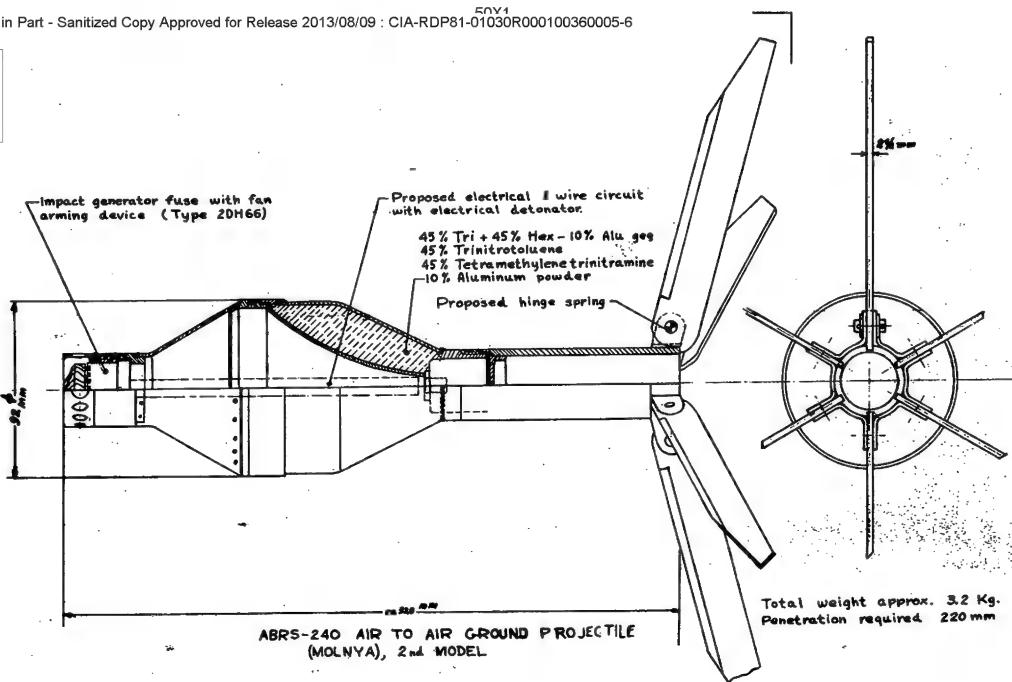


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Penetration 150 to 200mm Armor Plate
Weight of Explosive 950 Grams
Composed of - Trinitrotoluene 45%
Tetramethylenetrinitramine 45%
Aluminum Powder 10%
Total Weight Approximately 4.5 Kg.

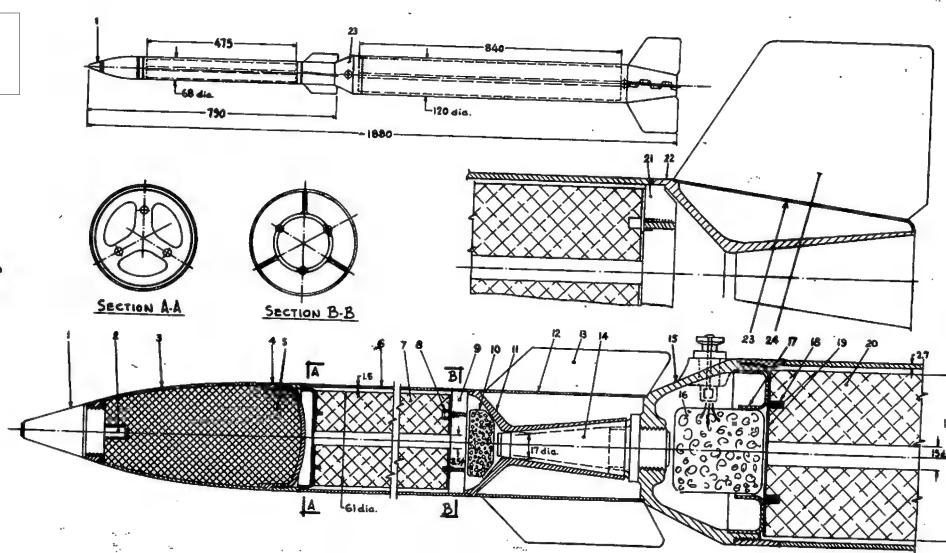
1	Fan
2	Alternating Current Generator
3	Selenium Rectifier
4	Condenser
5	Electrical Igniter
6	Contact Cap



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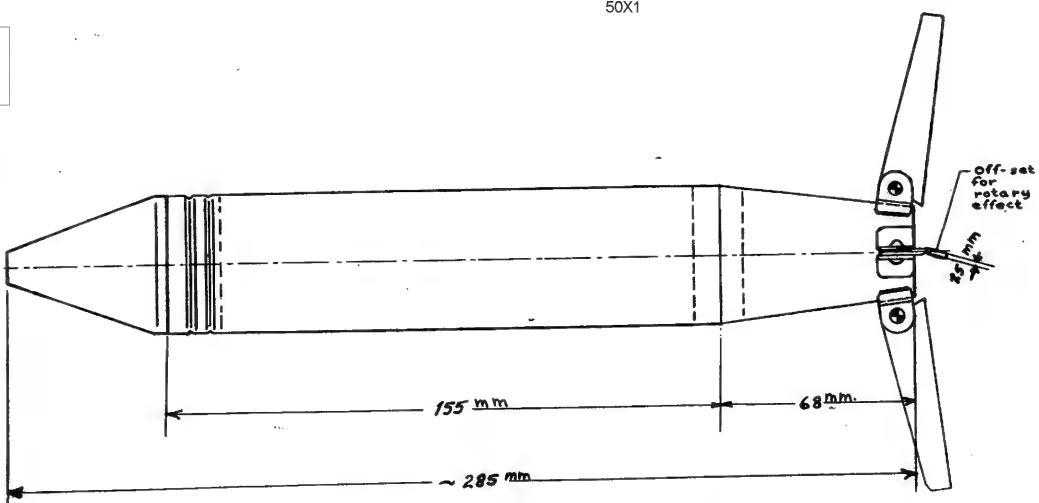
THE ZENITH GROUND TO AIR MISSILE

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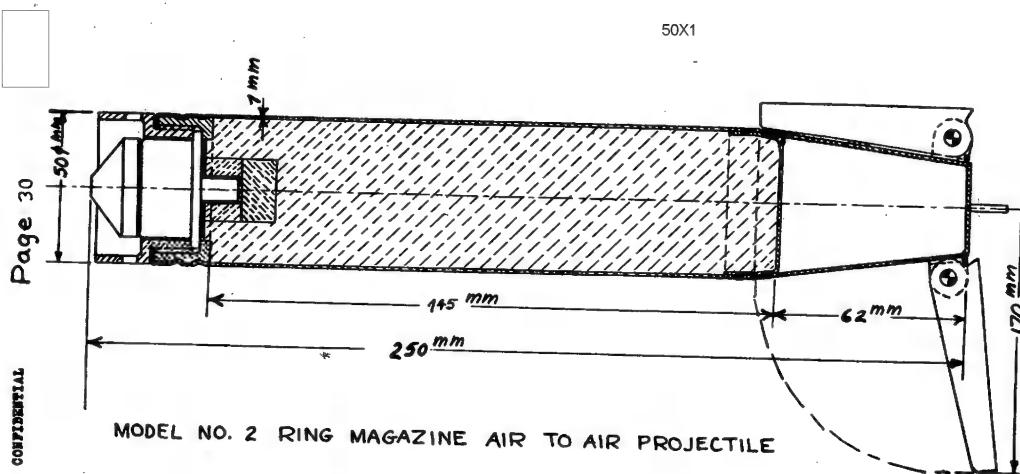
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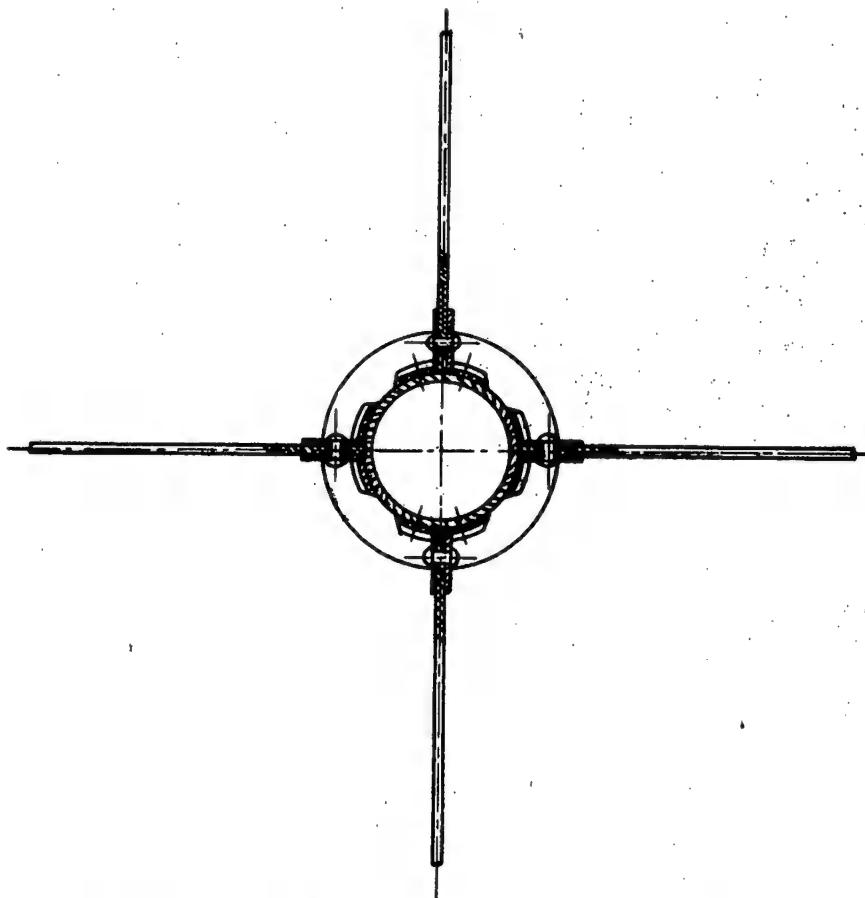
MODEL NO. 1. RING MAGAZINE AIR TO AIR PROJECTILE



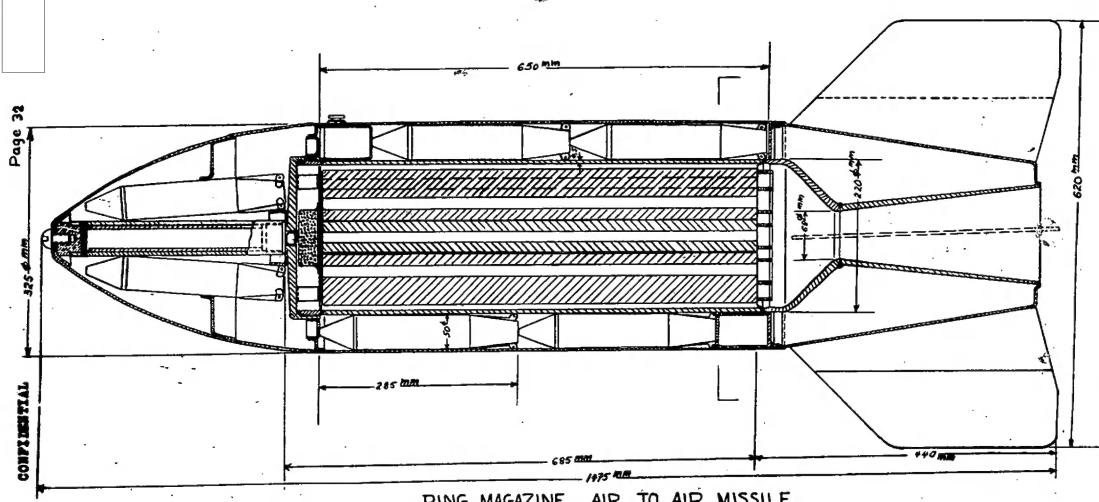
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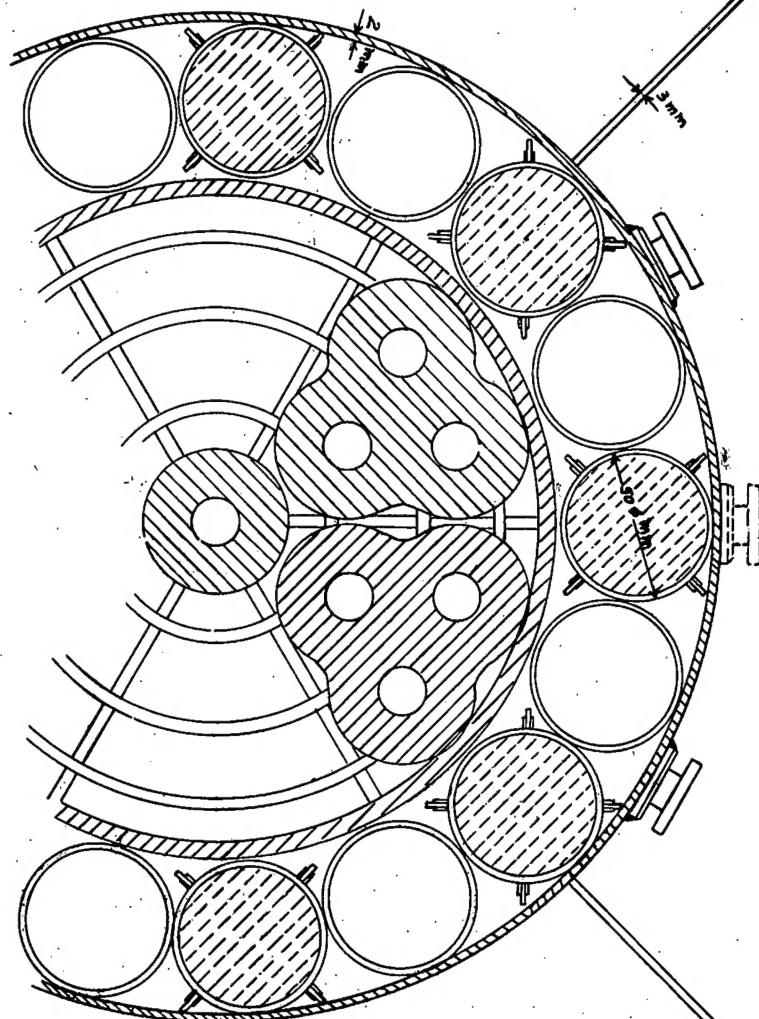
REAR VIEW, RING MAGAZINE AIR TO AIR
PROJECTILE - MODEL NO. 1 & NO. 2



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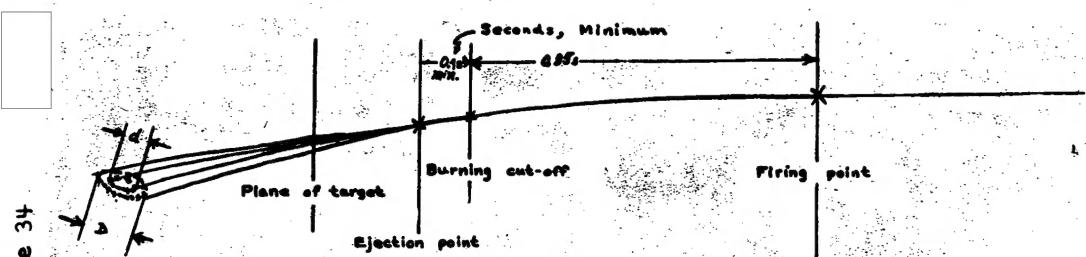
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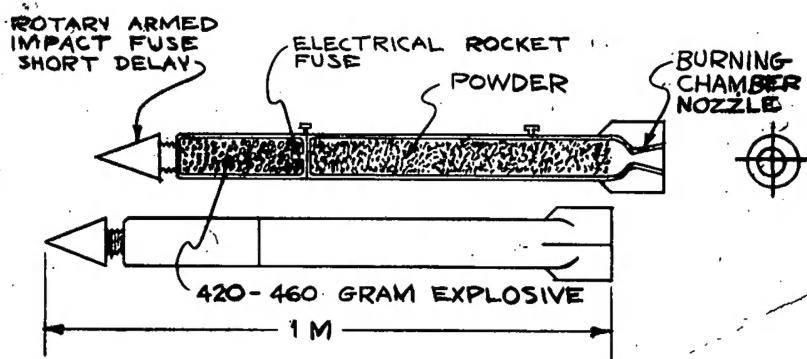
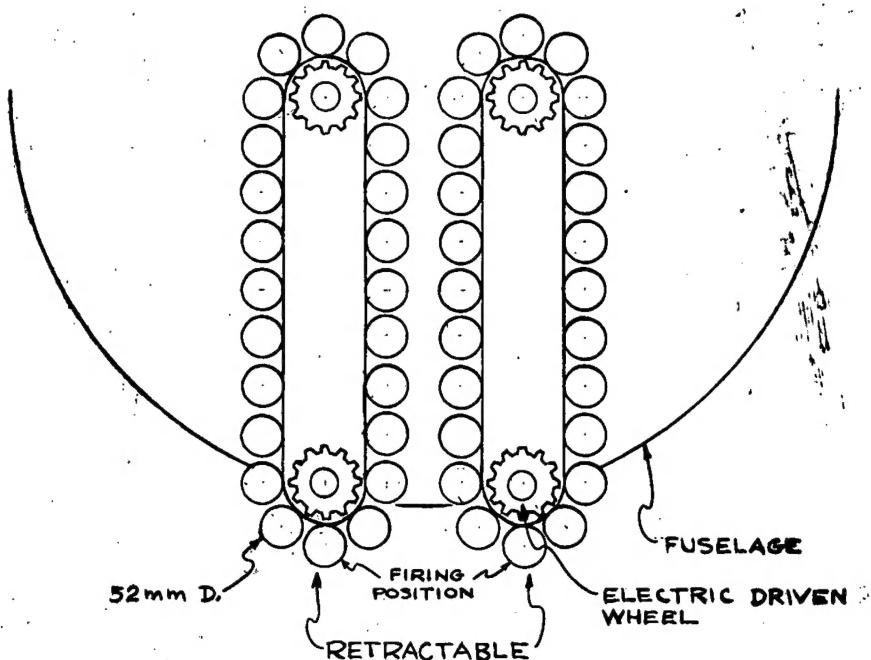
CROSS SECTION, RING MAGAZINE
AIR TO AIR MISSILE

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TRAJECTORY RING MAGAZINE
AIR TO AIR MISSILE

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Page 35AUTOMATIC AIR TO AIR ROCKET

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